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EXAMINER	
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3664	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,938	MAKELA ET AL.	
	Examiner	Art Unit	
	Jorge O. Peche	3664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *8-10* is/are allowed.

6)☒ Claim(s) *1-7 and 11-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/30/2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Receipt is acknowledged of Applicant's request for continued examination and argument/remarks filed on June 26, 2009 and September 1, 2009, claims 1-20 are pending and an action on the merits is as follows.

Applicant's arguments with respect to claims 1-20 have been fully considered but are moot in view of a new ground(s) of rejection. Applicant has amended claims 1-10 and added claims 11-20. The Examiner has withdrawn claim 8 rejection under 35 U.S.C. 112, first paragraph

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim **1** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The invention fails to disclose "with no identifier whose location is accurately known" (see specification, par. 5, 7, 24, 29, 30, and 31).

Foreign Priority

Applicant cannot rely upon the foreign priority papers (FINLAND 20031007 and 20040059) to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

> The only times during ex parte prosecution that the examiner considers the merits of an applicant's claim of priority is when a reference is found with an effective date between the date of the foreign filing and the date of filing in the United States and when an interference situation is under consideration. If at the time of making an action the examiner has found such an intervening reference, he or she simply rejects whatever claims may be considered unpatentable thereover, without paying any attention to the priority date (assuming the papers have not yet been filed). The applicant in his or her reply may argue the rejection if it is of such a nature that it can be argued, or present the foreign papers for the purpose of overcoming the date of the reference. If the applicant argues the reference, the examiner, in the next action in the application, may specifically require the foreign papers to be filed in addition to repeating the rejection if it is still considered applicable, or he or she may merely continue the rejection. Form paragraph 2.19 may be used in this instance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **11-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hakkinen (Pub No.: WO 01/69041 A1)** in view of **Lehtinen et al. ("Mobile robots evolving in industrial applications",** Proceedings of the 31st International Symposium on Robotics, Montreal, pp.96-101**).**

Regarding **claim 11**, Hakkinen discloses a method for determining the position of unmanned mining vehicle comprising the step of:

- Driving mining vehicles (3, 4, and 5) on a service gallery (2) and a plurality of mine galleries (1) (first and second work areas) where the service gallery (2) is only provided with an identifier (16b) painted on the wall (accurately known location)(see page 4, lines 2-10; page 7, lines 14-24; Figure 1).
- Identifying mining mark (6) and location information (6") to determine the position of the loading vehicle (see page7, lines 2-5, lines 22-24; Figures 5-7).
- Transmitting location information (6") of the loading vehicle (5) to a computer room (mine control system) by implementing a data communication unit (13) (control unit). Under this process, the transmitted data is used to monitor the operation of the loading vehicle (5) (see page 2, lines 15-23; page 6, lines 1-9, lines 33-34; page 7, lines 1-5; Figures 4-5).

However, Hakkinen's invention fails to disclose a method for determining the location of the mining vehicle substantially continuously in the first work and the second work area on the basis of a dead reckoning, wherein the distance traveled is calculated and the travel direction is determined, determining, when operating in the second work area, the location of the mining vehicle only on the basis of the dead reckoning; updating the location data determined in the dead reckoning on the basis of the location data of the identifier when driving in the first work area; and a method comprising the second work area is provided with no identifier, and wherein the size of the second work area is sufficient to cause a mining vehicle during at least one work cycle to have

discontinuities in location updates obtained by identifiers with accurately known locations.

However, Lehtinen teaches a dead reckoning unit to determine the position, distance and direction of a vehicle in a mine/underground environment. Furthermore, Lehtinen teaches the use of dead reckoning and beacon, transponder and landmark (e.g. location information (6") disclosed on Hakkinen's invention) to adjust the exact absolute pose of a mining vehicle after traveling a certain distance (see page 96, abstract, left col. par. 7; page 98, left column, par 1-3; page 99, left col. par. 1-6). As the landmarks are spread across the work area at a certain distance (e.g. 20 meters), the work area can be subdivided in two multiple areas: (i) area with identifier (first work area) and (ii) area without identifier (second work area). The area without identifier can cover a large distance, where the vehicle can use the dead reckoning system to determine its position and/or location (*second work area is sufficient to cause a mining vehicle … to have discontinuities in location obtained by identifier with accurately known location*)

Given the teaching of Lehtinen, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to replace the inertial measurement device (11) of driving mining vehicle (3) (Hakkinen's invention), which can be used as a dead reckoning unit (see page 2, lines 15-23, page 5, lines 28-35; Figure 4), by a dead reckoning device (Lehtinen's reference) or to incorporate a dead reckoning device (Lehtinen's reference) within the driving mining vehicle (4 & 5) to continuously determine and update the position, distance and direction of a mining vehicle within a

multiple work areas, specially when new mine gallery areas are excavated. Figure 1a clearly depicts a shaded mine gallery area (1') (new second work area) where the mining vehicle (4 & 5) would operate and create a new mine gallery and where identifiers do not exist (whose location is accurately known). Figure 1a also depicts existing mine gallery (1) where the mining vehicle (4 & 5) would operate to enlarge the area (1) to the shaded area (1') and where identifiers do not exist. Under this process, mine gallery (1) can be subdivided in two areas (i) area with identifier (new first work area) and (ii) area without identifier (new second work area) Furthermore, given the method for determine the position, distance and direction of a vehicle in a mine/underground environment by using a dead reckoning (e.g. in a second work area) and adjusting the exact absolute pose of a mining vehicle after traveling a certain distance by implementing landmark (e.g. in a first work area), it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement this technique in a plurality of mining areas to determine the location and update the position of a mining vehicle.

Doing so would enhance an autonomous vehicle capable to travel across an environment with small amount of advance information.

Regarding **claims 12-15**, Hakkinen discloses a method for determining the position of unmanned mining vehicle comprising the step of:

- Placing a location information mark (6") (readable identifier) in a mine gallery (1) (first work area) (see page 4, lines 2-10; page 7, lines 1-5; Figures 1 and 5).

- Arranging positioning marks (6' and 6") in advance to the loading vehicle control unit (19) (see page 6, lines 10-36; page 7, lines 1-13; Figure 5).
- Reading position mark (6') and location information (6') (identifier) placed in the mine gallery (1) with a reader device (12) to determine the location of the loading vehicle (5) (see page 4, lines 2-10; page 6, lines 33-36; page 7, lines 1-13; Figures 1-5).

However, Hakkinen's invention fails to disclose a method for updating the location data obtained on the basis of the dead read reckoning; arranging at least one identifier comprising a receiver in the first work area, and transmitting a signal for reading the identifier from a transmitter in the mining vehicle when driving in the first work area

However, Lehtinen teaches a dead reckoning unit to determine the position, distance and direction of a vehicle in a mine or underground environment. Furthermore, Lehtinen teaches the use of landmark (e.g. location information (6") disclosed on Hakkinen's invention) to adjust or update the exact absolute pose of a mining vehicle after traveling a certain distance (see page 96, abstract, page 98, left column, par 1-3).

Furthermore, Lehtinen teaches the use of a visual beacon unit at known location to improve mining/underground vehicle position, which can replace or be added to the location information mark (6") (see page 96, right column, par 7; page 98, left column, par. 1-3). As the visual beacon is capable to transmitted location/position signal and the mining vehicle, with a dead reckoning and control unit (19), can transmit a request signal for location/position (see Figure 5), it would be obvious that a

mining/underground vehicle and the beacon unit can communicate between each other to determine the mining vehicle location.

Doing so would enhance an autonomous vehicle capable to travel across an environment with small amount of advance information and obtain real time vehicle position by implementing a plurality beacon of unit.

Regarding **claim 16**, Hakkinen discloses a wireless communication system to transmit position, location, and operation of the loading vehicle to a control room (see page 4, lines 1-15; page 7, lines 1-5; Figures 1 and 4). Under this process, it would be obvious that the wireless communication system would have al least one base station and or repeater on the mine gallery (1) and a service gallery (2) to forward the loading vehicle information to the control room (see prior art made of record at conclusion).

However, Hakkinen's invention fails to disclose a method for updating the location data obtained on the basis of the dead reckoning.

However, Lehtinen teaches a dead reckoning to determine the position, distance and direction of a vehicle in a mine or underground environment. Furthermore, Lehtinen teaches the use of beacon and landmark (e.g. location information (6") disclosed on Hakkinen's invention) to adjust or update the exact absolute pose of a mining vehicle after traveling a certain distance (see page 96, abstract, page 98, left column, par 1-3).

Doing so would enhance an autonomous vehicle capable to travel across an environment with small amount of advance information and obtain real time vehicle position by implementing a plurality beacon of unit.

Regarding **claim 17**, Hakkinen discloses a method for determining the position of unmanned mining vehicle comprising the step of:

- Driving mining vehicles (3, 4, and 5) on a plurality of mine galleries (1) and a service gallery (2) (see page 4, lines 2-10; Figure 1). It would be obvious that a loading vehicle (5) would drive from a service gallery (2) (unloading area) to a mine gallery (1) (loading area).
- Loading cargo into the loading vehicle (5) in the mine gallery (1) (see Figure 5). Under this process, it would be obvious that the loading vehicle (5) would drive its cargo from the mine gallery to the service gallery to unload its cargo.

However, Hakkinen's invention fails to disclose a method for determining the location of the mining vehicle in the loading area only on the basis of the dead reckoning, and determining the location of the mining vehicle in the unloading area both on the basis of the dead reckoning and by reading at least one identifier arranged in the unloading area.

However, Lehtinen teaches a dead reckoning to determine the position, distance and direction of a vehicle in a mine or underground environment. Furthermore, Lehtinen teaches the use of beacon and landmark (e.g. location information (6") disclosed on Hakkinen's invention) to adjust or update the exact absolute pose of a mining vehicle after traveling a certain distance (see page 96, abstract, page 98, left column, par 1-3).

Under this process, as the mining vehicle (4) excavates new section on the mine gallery (1), it would be obvious that location information mark (6") would not be available on this new area. Therefore, it would be obvious that the mining vehicle would only

implement its dead reckoning device to navigate in the new area or section of the mine gallery (1). Furthermore, as the mining vehicle transport its cargo to the service gallery (unload area), the mining vehicle can relay on its dead reckoning unit and beacon device (identifier) installed across (critical location) the mining/underground area, which can include service gallery (unload area), to accurately adjust and/or update the exact absolute pose of a mining vehicle after traveling a certain distance.

Doing so would enhance an autonomous vehicle capable to travel across an environment with small amount of advance information and obtain real time vehicle position by implementing a plurality of beacon unit.

Regarding **claims 18-20**, Hakkinen discloses a system to determine the position of unmanned mining vehicle comprising:

- A plurality of mine galleries (1) and a service gallery (2) (first and second work areas) to drive mining vehicles (3, 4, and 5) where the service gallery (2) is only provided with an identifier (16b) painted on the wall (accurately known location)(see page 4, lines 2-10; page 7, lines 14-24; Figure 1).
- A computer room (mine control system) to wirelessly receive (data transfer connection) location information (6") of the loading vehicle (5) by implementing a data communication unit (13) (control unit). Under this apparatus, the transmitted data is used to monitor the operation of the loading vehicle (5). To monitor the exact location of the loading vehicle by an operator or server, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to

conclude that the position of the mine location information (6") (predetermined location of the identifier) is known to the computer room (see page 2, lines 15-23; page 4, lines 10-17; page 6, lines 1-9, lines 33-34; page 7, lines 1-5; Figures 4-5).

- Mining mark (6) and location information (6") (identifier) are placed in advance to the loading vehicle control unit (19) in a mine gallery (1). Under this system, the loading vehicle (5) implements a reader device (12) to read the location information (6") (identifier/ location data) to determine its position and location, where a service gallery (2) is only provided with an identifier (16b) painted on the wall (accurately known location) (see page 4, lines 2-10; page 6, lines 10-36; page7, lines 2-24; Figures 1 and 5-7).

However, Hakkinen's invention fails to disclose a system comprising for monitoring the location of a mining vehicle comprising the second work area is provided with no identifier whose location is accurately known ,at least one measuring device for determining the distance traveled by the mining vehicle, and further at least one measuring device for determining the direction of the mining vehicle; and the location of the mining vehicle is arranged to be determined substantially continuously in the first work area and the second work area on the basis of a dead reckoning by taking into account the distance traveled and the direction; the location of the mining vehicle is arranged to be determined only on the basis of the dead reckoning, when operating in the second work area, and wherein the size of the second work area is sufficient to

cause a mining vehicle during at least one work cycle to have discontinuities in location updates obtained by identifiers with accurately known locations

However, Lehtinen teaches a dead reckoning (measuring device) to determine the position, distance and direction of a vehicle in a mine/underground environment. Furthermore, Lehtinen teaches the use of beacon, transponder and landmark (e.g. location information (6")) to adjust or update the exact absolute pose of a mining vehicle's dead reckoning after traveling a certain distance (see page 96, abstract, page 98, left column, par. 1-3). As the landmarks are spread across the work area at a certain distance (e.g. 20 meters), the work area can be subdivided in two multiple areas: (i) area with identifier (first work area) and (ii) area without identifier (second work area). The area without identifier can cover a large distance, where the vehicle can use the dead reckoning system to determine its position and/or location (*second work area is sufficient to cause a mining vehicle … to have discontinuities in location obtained by identifier with accurately known location*)

Furthermore, as the mining vehicle transport its cargo to the service gallery (unload area), the mining vehicle can relay on its dead reckoning unit and beacon device (identifier) installed across the mining/underground area (critical location), which can include service gallery (unload area), to accurately adjust and/or update the exact absolute pose of a mining vehicle after traveling a certain distance.

Given the teaching of Lehtinen, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to replace the inertial measurement

device (11) of driving mining vehicle (3) (Hakkinen's invention), which can be used as a dead reckoning unit (see page 2, lines 15-23, page 5, lines 28-35; Figure 4), by a dead reckoning device (Lehtinen's reference) or to incorporate a dead reckoning device (Lehtinen's reference) within the driving mining vehicle (4 & 5) to continuously determine and update the position, distance and direction of a mining vehicle within a multiple work areas, specially when new mine gallery areas are excavated. Figure 1a clearly depicts a shaded mine gallery area (1') (new second work area) where the mining vehicle (4 & 5) would operate and create a new mine gallery and where identifiers do not exist (whose location is accurately known). Figure 1a also depicts existing mine gallery (1) where the mining vehicle (4 & 5) would operate to enlarge the area (1) to the shaded area (1') and where identifiers do not exist. Under this process, mine gallery (1) can be subdivided in two areas (i) area with identifier (new first work area) and (ii) area without identifier (new second work area) Furthermore, given the method for determine the position, distance and direction of a vehicle in a mine/underground environment by using a dead reckoning (e.g. in a second work area) and adjusting the exact absolute pose of a mining vehicle after traveling a certain distance by implementing landmark (e.g. in a first work area), it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement this technique in a plurality of mining areas to determine the location and update the position of a mining vehicle.

Doing so would enhance an autonomous vehicle capable to travel across an environment with small amount of advance information.

Allowable Subject Matter

Claim 8- 10 are allowed.

Response to Argument

In the Applicant's arguments/remarks filed on September 1, 2008, with respect to the rejections of **claims 1-7** under 35 U.S.C. 103(a) as being unpatentable over **Hakkinen (Pub No.: WO 01/69041 A1)** in view of **Lehtinen et al. ("Mobile robots evolving in industrial applications",** Proceedings of the 31st International Symposium on Robotics, Montreal, pp.96-101**)** have been fully considered but are not persuasive.

Regarding Applicant's argument, Applicant is kindly invited to view the new grounds of rejection for more detail comment.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Base Station and/or repeater: **Bassiri et a**l (see page 1, par. 3, 6, 7; page 5, par. 43-45; Figures 5-9).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jorge O. Peche whose telephone number is 571-270-1339. The examiner can normally be reached on 8:30 am - 5:30 pm Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Khoi H. Tran can be reached on 571-272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jorge O Peche/

Examiner, Art Unit 3664

September 7, 2009

/KHOI TRAN/

Supervisory Patent Examiner, Art Unit 3664